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REMARKS

Claim 1 through 10, 12-13, 29-30 and 32-47 are currently pending in the application. Claims 45-47 are newly added claims.

The Examiner has subjected the pending claims to an election/restriction requirement. The Examiner states that previously added Claims 27 and 31 are drawn to a method which is distinct from that claimed in Claims 14-21 and 25 and, as such, has withdrawn Claims 27-31 from consideration as being directed to a non-elected invention.

The Examiner has rejected Claims 14, 19, 20, 25, 34-36, 42 and 43 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1 and 2 of U.S. Patent 6,531,202 (Litvinov, et al.) in view of U.S. Patent 4,632,883 (Howard, et al.). The Examiner states that Litvinov claims a perpendicular magnetic recording disc comprising a substrate and a soft magnetic layer exhibiting magnetic anisotropy in a radial direction. The Examiner further states that Howard, et al. teaches that it is known in the art to use non-magnetic spacing materials between the substrate and the soft magnetic layers to improve the adhesion of the soft magnetic layer to the substrate.

In response, the Applicants have modified Claim 14 and Claim 34 to include the limitation that the soft magnetic layer be *inherently* magnetically anisotropic. The object of the present invention is to provide a soft magnetic underlayer distinguishable from prior art soft magnetic underlayers in that it has an internal anisotropy mechanism, rather than relying on interfaces between other layers to inhibit the formation of magnetic domain walls and to provide the single domain state. The structure of Litvinov utilizes linkages between the soft magnetic underlayer and other layers which induce a magnetic field in the soft magnetic underlayer to provide a single magnetic domain state. Litvinov states, at Column 1, lines 49-55:

> The present invention provides perpendicular recording media having a soft magnetic underlayer and *magnetic regions which generate an external magnetic field in the soft magnetic*

> *underlayer. The soft magnetic underlayer is brought into a substantially single domain state by the magnetic field.*

(emphasis added), and at Column 1, lines 64-67:

> An aspect of the present invention is to provide a perpendicular a perpendicular magnetic recording medium including a soft magnetic underlayer and *means for generating a magnetic field in the soft magnetic underlayer.*

(emphasis added). The means for generating a magnetic field in the soft magnetic underlayer in Litvinov are two ring shaped bands of magnetic material, noted as reference numbers 26 and 28 in Figures 2 and 3 of Litvinov. The Applicants submit that the present invention is distinguished from the Litvinov reference by the addition of the limitation that the soft magnetic underlayer be *inherently* magnetically anisotropic. Additionally, the cited Howard reference does not disclose a soft magnetic underlayer having a single magnetic domain, and as such, the combination of Litvinov and Howard does not teach the present invention. Therefore, the Applicants respectfully submit that the rejection based on non-statutory double patenting grounds of Claims 14, 19, 25, 34-36, 42 and 43 has been traversed.

The Examiner has rejected Claims 29, 30 and 44 under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. In response, the Applicants have withdrawn Claims 29 and 30 and have modified Claim 44 to state that the soft magnetic underlayer have an *anisotropy* field of approximately 40 Oe instead of a *saturation* field.

The Examiner has rejected Claims 14, 34-36 and 43 under 35 U.S.C. § 102(e) as being anticipated by Litvinov, et al. and, in addition, under 35 U.S.C. § 102(f) as not being invented by the Applicants. As stated previously with respect to the obviousness-type double patenting rejection, the Applicants have modified Claims 14 and 34 to state that the soft magnetic underlayer is *inherently* magnetically anisotropic and have provided remarks distinguishing those claims from Litvinov, et al. Therefore, the Applicants respectfully submit that the rejection

under 102(e) has been traversed as well as the rejection under 102(f), as the Applicants should now be considered the inventors of the newly-amended claims.

The Examiner has rejected Claims 19, 20, 25 and 42 under 35 U.S.C. § 103(a) as being not patently distinct from Claims 1 and 2 of Litvinov. The same amendment and remarks distinguishing the present invention from Litvinov apply to the rejection of Claims 19, 20, 25 and 42 as these claims depend from Claims 14 and 34 respectively.

The Examiner, in paragraph 17, has rejected Claims 14, 25, 34-37, 42 and 43 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,687,712 (Sugita, et al.) in view of U.S. Patent 6,395,413 (Ando) and U.S. Patent 5,942,342 (Hikosaka, et al.). The Examiner states that Sugita discloses the invention except that Sugita fails to disclose a soft magnetic underlayer acting as a single magnetic domain. However, Ando and Hikosaka both teach that is it known in the art to eliminate domain walls in soft magnetic underlayers to prevent Barkhausen noise. The Applicants respectfully submit that both Ando and Hikosaka require external biasing means to eliminate the magnetic domain walls within their respective soft magnetic underlayers. With respect to Hikosaka, et al. the Applicants draw the Examiner's attention to Column 9, lines 22-34 in which it is explained that the elimination of the domain walls in the soft magnetic film is due to exchange coupling between soft magnetic film 12 and an antiferromagnetic film 14, which is shown in Figure 4. Therefore, the soft magnetic film 12 of Hikosaka is not *inherently* magnetically anisotropic as is the soft magnetic underlayer claimed by the Applicants. Hikosaka states, at Column 9, lines 22-36:

> The perpendicular recording medium shown in FIG. 4 comprises a substrate 11, a soft magnetic film 12, an antiferromagnetic film 14, a perpendicular magnetization film 1 and a protective film 15, which are formed one upon another in the order stated. The soft magnetic film 12 and the antiferromagnetic film 14 constitute an underlayer. *This structure is designed to utilized the exchange coupling between the soft magnetic film 12 and the antiferromagnetic film 14. More specifically, due to the exchange coupling, a bias magnetic field, which is stronger than the coercivity of the soft magnetic film 12, is applied normal to the*

recording track of the medium (i.e., in the radial direction of the medium), thereby preventing the generation of the domain walls in the soft magnetic film.

(emphasis added). Likewise, Ando requires a pinning layer to eliminate the formation of domain walls in the soft magnetic layer. The Applicants draw the Examiner's attention to Column 4, lines 4-10, in which the structure of the medium is explained:

> Further, in the above perpendicular magnetic recording medium, *a hard magnetic pinning layer may be formed under the soft magnetic layer of the Co-Zr system amorphous to suppress the formation of domain walls of the soft magnetic layers thereof.* The hard magnetic pinning layer is effective to secure a low noise and a thermal stability of recording signals to strong magnetic fields. [sic]

(emphasis added). Therefore, the soft magnetic underlayers of both Hikosaka and Ando are not *inherently* magnetically anisotropic, but require the biasing mechanisms set forth above. As a result, the combination of Sugita, Ando and Hikosaka fails to disclose or render obvious a soft magnetic underlayer which is inherently magnetically anisotropic.

In paragraph 18 the Examiner has rejected Claims 1-3, 9, 10, 32, 38 and 40 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando and Hikosaka as applied in paragraph 17, and further in view U.S. Patent 6,468,670 (Ikeda, et al.). The Examiner relies on Ikeda to demonstrate the equivalence of NiFe and the claimed iron-cobalt-boron alloy of the present invention as appropriate materials for the formation of a soft magnetic underlayer. The Applicants' remarks above with respect to Ando and Hikosaka apply here as well. Mainly that neither Ando or Hikosaka or the combination of Sugita, Ando and Hikosaka disclose utilizing an *inherently* magnetically anisotropic soft magnetic underlayer. Both Ando and Hikosaka rely on pinning layers or biasing means to eliminate magnetic domain walls within the soft magnetic underlayer, whereas the present invention does not. Further, Ikeda does not disclose NiFe as being inherently magnetically anisotropic.

Additionally, in paragraph 18, the Examiner states that Sugita teaches that the thickness of the non-magnetic spacing layers and soft magnetic underlayers can be varied to effect the recording and reproducing characteristics in a perpendicular magnetic recording medium. However, Sugita only teaches that the reproduction output in Figure 4, and the initial permeability in Figure 5 can be varied with respect to the thickness of the permalloy. No mention is made in Sugita or in any other reference regarding varying the thickness of an iron-cobalt alloy to effect elimination of magnetic domain walls to bring a layer of the material into a single magnetic domain state. Indeed, no mention is made in Sugita of the desirability of having the soft magnetic underlayer in a single magnetic domain state. Therefore, the Applicants respectfully submit that applying Sugita to teach varying the thickness or the other properties of the soft magnetic underlayer to eliminate a magnetic domain walls is inappropriate.

The Examiner has rejected Claims 4-6, 12, 13, 19, 20, 29, 30, 33 and 41 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando, Hikosaka and Ikeda as applied above and further in view of Howard. The Examiner utilizes Howard to show that Ti and Ta are known equivalents in the field of non-magnetic spacing materials. The Applicants respectfully submit that these claims, as being dependent upon parent claims which the Applicant now believes to be patentable in view of the amendments herein and the remarks above, should also be patentable.

The Examiner has rejected Claims 7, 8, 15-18, 21 and 39 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando, Hikosaka and Ikeda, et al. as applied above and further in view of several other references, all of which are used to show that the amount of cobalt, iron and boron in a CoFeB soft magnetic underlayer can be varied to effect the soft magnetic properties thereof, which the Examiner claims is well known in the art. However, the Applicants are not relying on varying amounts of various elements in the alloy to effect the

magnetic properties thereof and, in fact, no known combination of varying amounts of cobalt, iron and boron in an alloy will result in an alloy which is magnetically anisotropic and lacking magnetic domain walls unless the layers are manufactured in accordance with one of the two methods disclosed in the present application namely, multiple layers of FeCoB wherein each layer is ~80 nm in thickness or less, or depositing several layers of the FeCoB alloy interspersed with nonmagnetic spacing material or depositing a large (~240 nm) layer of the FeCoB alloy and flash annealing after deposition. The Applicants respectfully submit that, absent these techniques, no teaching exists that an alloy of FeCoB is inherently magnetically anisotropic.

The Examiner has rejected Claim 44 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando and Hikosaka as applied above and further in view of a web document entitled "Chapter I Introduction." In view of the Examiner's rejection under § 112 of Claim 44, the Applicants have modified Claim 44 to remove the limitation that the saturation field be greater than 40 Oe and instead have substituted that the anisotropy field of the soft magnetic layer is greater than 40 Oe. As a result, the rejection of Claim 44 in this manner should be rendered moot thereby.

CONCLUSION

The Applicant has modified independent Claims of the application to specify that the soft magnetic underlayer described in the structures herein be *inherently* magnetically anisotropic, as opposed to being forced into a magnetically antistrophic state by pinning layers or other biasing elements. This modification to the claims distinguishes the claims of the present invention from all combinations of cited prior art and the Applicants respectfully submit that, as a result of these amendments and the remarks provided above, all currently pending claims of the application are now in condition for allowance and respectfully request a Notice of Allowability for all currently pending claims at the earliest possible time.

Should the Examiner have any questions regarding these amendments or any of the claims or remarks herein, the Applicant requests that the Examiner contact the Applicants' attorney using the contact information listed below.

Respectfully Submitted,

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